? - Ground moraine Geol Survey doesn't show
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a guide to the geology of the Hardin area

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Field Trip 1983A
April 30, 1983

Illinois Department of Energy and Natural Resources
STATE GEOLOGICAL SURVEY DIVISION
Champaign, Illinois

guide to the route

Miles to next point	Miles to starting point	
		Start of Hardin Geological Science Field Trip. Line up facing east on the south driveway of Calhoun High School. The mileage figures start at the intersection of the south driveway and State Route 100. (Near Center SE¼ NW¼ NW¼, Sec. 23, T. 10 S., R. 2 W., 4th P.M.; Hardin 7.5-minute Quadrangle).
0.0	0.0	TURN LEFT (north) with extreme caution, and enter Route 100.
0.6	0.6	To the left is an alluvial fan—a fan-shaped deposit that extends out into the main valley from a small tributary eroded in the bluff.
0.2	0.8	Notice the prominent bluff ahead, which has a vertical east-facing cliff and a gentle west slope. It is capped by the Valmeyeran (middle Mississippian) Burlington Limestone.
0.5	1.3	Prepare to turn left.
0.15	1.45	CAUTION; cross bridge and TURN LEFT (west) onto blacktop road. Curve just ahead on Route 100 restricts vision; fast traffic.
0.35+	1.8+	CAUTION; narrow culvert.
0.1-	1.9	To the right, particularly in the roadcut, a considerable amount of slumping has occurred because of heavy rains.
0.2-	2.1-	CAUTION; narrow culvert.
0.05+	2.15	STOP 1. LANDSLIDE AND SLUMP ON THE NORTH SIDE OF THE ROAD. (S edge NE¼ NW¼ NW¼ SE¼, Sec. 10, T. 20 S., R. 2 W., 4th P.M.,; Hardin 7.5-minute Quadrangle).
0.0	2.15	Leave Stop 1. CONTINUE AHEAD (west).

Miles to next point	Miles to starting point	
0.45	2.6	To the left across the creek, high water has cleaned off the channel banks, exposing the alluvial deposits that fill the valley.
0.1+	2.7+	TURN RIGHT (northwest) at T-road just before bridge. The chert gravel in the field to the right was deposited by high waters that coursed down this valley during December 1982.
0.25-	2.95	STOP 2. SLUMP SCARPS ALONG THE CREEK TO THE SOUTHWEST. (E edge SE¼ NE¼ SE¼ NE¼, Sec. 9, T. 10 S., R. 2 W., 4th P.M.; Hamburg 7.5-minute Quadrangle).
0.0	2.95	Leave Stop 2 and CONTINUE AHEAD (westerly).
0.05	3.0	To the right, a mobile home site has been cut into the hill slope. From the size of the cut and the instability of some of these materials locally, this may not be the best location for that structure.
0.3-	3.3-	CAUTION; narrow culvert. The road has been washed badly on both sides. Beyond the culvert and to the left across the creek are some large bulges in the slope that probably are old slump masses.
0.05+	3.35	The exposure across the creek to the left shows some color banding, indicating that the material was deposited in a standing body of water. Slumping has messed up the exposure considerably. CONTINUE AHEAD (west).
0.15	3.5	To the left across the creek is an exposure of greenish-gray Kinderhookian (lower Mississippian) Hannibal Shale. Outcrops of this shale and the overlying Mississippian Chouteau Limestone are seen more frequently in the western part of this valley.
0.15-	3.65-	CAUTION; ford creek and park in the small shelter area on the right.
		STOP 3. DISCUSSION OF SPRING AND VIEW OF THE CONTACT BETWEEN THE HANNIBAL SHALE AND CHOUTEAU LIMESTONE. (NE¼ SE¼ SE¼ SE¼. Sec. 4, T. 10 S., R. 2 W., 4th P.M.; Hamburg 7.5-minute Quadrangle).

Miles to next point	Miles to starting point	
0.0	3.65	Leave Stop 3 and CONTINUE AHEAD (westerly). Nearby on the left are several large trees that were uprooted by wind after the ground had been saturated by rain last December.
0.2+	3.85	To the right, the Chouteau Limestone floors the creek bottom.
0.05-	3.9-	CAUTION; narrow culvert has washouts on both sides. CONTINUE AHEAD (west) up the steep hill.
0.1+	4.0	To the right on the far valley wall the slope below the fence corner has been severely eroded just this side of the wooded area. This erosion probably occurred along paths formed by cattle.
0.4	4.4	BEAR LEFT (west) at Y-intersection.
0.05	4.45	The route is now across the uplands of Calhoun County.
0.2+	4.65+	Notice the abrupt beginnings of the small grassed valleys that have been eroded into the upland surface here.
0.1-	4.75-	CAUTION; descend steep hill.
0.25+	5.0	Y-intersection; BEAR RIGHT (westerly).
0.3	5.3	To the left the Chouteau Limestone is exposed along the creek.
0.1	5.4	In the creek to the left a small waterfall is held up by a resistant ledge of limestone.
0.05	5.45	An exposure of Hannibal Shale (greenish-gray at the top, blue-gray in the lower portion) can be seen across the creek to the left.
0.05	5.5	Shale is exposed just above creek level to the left for some distance.
0.2	5.7	The low hills to the right are remnants of terrace levels developed in this valley during glacial times from ponding to the west of the river(s) that now occupy the present Mississippi River Valley.
0.1+	5.8+	CAUTION; part of the road has been washed away.

Miles to next point	Miles to starting point	
0.1-	5.9	To the left across the creek behind the trailer is an exposure of Hannibal Shale overlain by Chouteau Limestone.
0.1	6.05	A thick exposure of the Hannibal Shale can be seen to the left across the creek. The steep slope above the shale is held up by the resistant Chouteau Limestone. On the left side of the exposure, a couple of large blocks of limestone have slid partway down the slope. CONTINUE AHEAD (westerly).
0.05	6.1	Note terraces above the road to the right.
0.05	6.15	The house to the left is located on a lower terrace level. About 300 feet southwest of the house is a thick exposure of Hannibal Shale in the creek bank. Several resistant silty layers stand out very prominently across the exposure.
0.3	6.45	To the left, the Hannibal Shale is very blocky.
0.15	6.6	In the creek bank to the left is a large exposure of Hannibal Shale that is blue-gray in the lower portion; the upper part is greenish-gray, but is covered over by loess and surface materials that are perhaps 12 to 15 feet thick. The shale exposure is some 30-35 feet in thickness; the base is not exposed. The Chouteau is not exposed here; it is covered by loess and surface materials. Just west of this exposure an old valley was cut down through the Hannibal Shale and then later was filled with slackwater silts and loess. CONTINUE AHEAD (west).
0.4	7.0	CAUTION; road wash-out on the left.
0.15	7.15	CAUTION; narrow culvert.
0.05	7.2	The upper terrace level on the right is very persistent locally.
0.05	7.25	To the left across the creek is an exposure of Kinderhookian (lower Mississippian) Louisiana Limestone and Horton Creek Formation.
0.25	7.5	STOP 4. DISCUSSION OF LOESS (IN THE ROAD CUT TO THE RIGHT ALONG THE BLACKTOP ROAD) AND THE DEVONIAN CEDAR VALLEY LIMESTONE AND UNDERLYING SILURIAN JOLIET LIMESTONE IN THE CREEK ON THE WEST SIDE OF THE BLACKTOP ROAD. (SE$\frac{1}{4}$ SW$\frac{1}{4}$ SW$\frac{1}{4}$ SW$\frac{1}{4}$, Sec. 36, T. 9 S., R. 3 W., 4th P.M.; Hamburg 7.5-minute Quadrangle).

Miles to next point	Miles to starting point	
0.0	7.5	Leave Stop 4. CONTINUE AHEAD (west).
0.05-	7.55-	STOP (1-way); T-road. TURN LEFT (southeast). USE EXTREME CAUTION on entering the blacktop; visibility is somewhat limited to the right over the hill and traffic is quite fast.
1.8+	9.35+	STOP 5. VIEW OF MISSISSIPPI VALLEY LOWLANDS AND THE MISSOURI HIGHLANDS TO THE WEST. LARGE AREAS OF THE LOWLANDS ARE OCCASIONALLY FLOODED. NOTICE THE EROSION AT THE END OF THE CONCRETE DITCH LINER TO THE SOUTH AND WEST OF THE ROAD. CAUTION; fast traffic and single strand electric fence on shoulder. (SE$\frac{1}{4}$ SE$\frac{1}{4}$ NE$\frac{1}{4}$ SW$\frac{1}{4}$, Sec. 12, T. 10 S., R. 3 W., 4th P.M.; Hamburg 7.5-minute Quadrangle).
0.0	9.35+	Leave Stop 5 and CONTINUE AHEAD (southerly).
0.15-	9.5	Thick loess exposure in the roadcut to the left.
0.15	9.65	CAUTION; narrow bridge.
0.1	9.75	To the left, note the overhanging ledges of Silurian Limestones. The lower tan, dolomitic Edgewood Formation is much more readily eroded than the overlying gray Kankakee Formation.
0.8-	10.55-	CAUTION; narrow culvert. Slightly ahead and to the left is a large slump block that has slid down toward the road. In the upper part of the block is a very pronounced trench that formed where it separated from the main part of the bluff as it slid downslope and rotated slightly.
0.1+	10.65	To the left, the Edgewood Formation has a spongy appearance and contains some "cave" openings, which actually reach only 12 to 15 feet back into the bluff. About six of these "caves" can be found within about 1/10 of a mile from here.
0.25	10.9	To the left, note the sharply rounded hilltops between several gullies emptying into the valley.
0.7	11.6	Across the fence to the left is a pit that exposes the greenish shale of the Ordovician Maquoketa Group.

Miles to next point	Miles to starting point	
0.05+	11.65+	CAUTION; narrow bridge.
0.15+	11.8+	TURN LEFT (northeasterly) at T-road; gravel road.
0.25	12.05+	CAUTION; narrow wooden bridge.
0.15-	12.2	Slackwater silts of the Equality Formation are exposed in several road cuts to the left.
0.15	12.35	CAUTION; to the right, the road has been partly washed away by the creek (weak bank).
0.6	12.95	The houses to the left are built on terrace remnants.
0.25	13.2	Note form in the creek to the right. Do you see anything nearby that might have caused it?
0.35-	13.55-	CAUTION; narrow culvert that has been washed out on both sides.
0.2+	13.75	Chouteau Limestone floors the creek to the right.
0.05	13.8	CAUTION; washout on right.
0.05	13.85	To the right out on the point by the gas tanks is a well. The well probably gets its water from the thin sediments filling this valley bottom.
0.4-	14.25-	To the right at the head of the ravine is a refuse dump. This is probably the most notorious example of this kind of dumping in Calhoun County. Everything gets dumped here, including raw garbage. (With run-off from this dump contaminating surface and groundwaters downstream, how would you like to have the well at mileage 13.85 for your water supply?) This dump probably accounts for the foam in the creek at mileage 13.2. BEAR RIGHT around the head of the ravine and dump.
0.2-	14.45-	STOP; T-road intersection. TURN RIGHT (south).
0.05+	14.5	Another dump, to the left, is not quite as large as the previous one.
0.75-	15.25-	STOP; T-road intersection. TURN LEFT (northwesterly).

Miles to next point	Miles to starting point	
0.4	15.65	CAUTION; prepare to descend steep Bobtail Hill.
0.05+	15.7	To the left is a mass of chert that weathered out of the Mississippian Burlington Limestone.
0.05	15.75	Blocks of Burlington Limestone are exposed around the curve. Notice the large masses of chert in the stone.
0.05	15.8	The exposure of the contact between the Burlington and the underlying Chouteau is somewhat slumped.
0.2	16.0	To the right are small exposures of the drab greenish-gray Hannibal Shale.
0.1	16.1	CAUTION; this road is very rough.
0.15	16.25	Another exposure of the Hannibal Shale to the right, with some surface materials slumped down over the upper portion.
0.25	16.5	To the right is the Horton Creek Formation.
0.2	16.7	To the right across the creek is an exposure of Equality Formation, 15 to 18 feet thick. Slack-water silts of a somewhat blocky texture, with lenses of angular gravels and some pods of finer sandy material, can be seen. The sandy material is yellow-brown, but overall, the exposure has a somewhat pinkish cast.
0.2	16.9	Limestone ledge (Horton Creek Formation) in the creek bottom to the right.
0.05	16.95	To the right is more of the limestone. The upper part is wavy bedded, and 3 to 4 feet thick; the top is somewhat slumped over. Below that is a more blocky, lighter gray, more dense limestone that is about 1½ to 2 feet thick down to water level.
0.01	17.05	To the right across the creek is a knob of Equality Formation silts and loess; 9 or 10 feet are exposed at the top. The bottom part is concealed by slump.
0.05	17.1	To the left is a terrace remnant.

Miles to next point	Miles to starting point	
0.15	17.25	To the right across the creek, more of the Equality Formation is exposed. The top of that exposure is approximately the same as the top of the terrace remnant to the northwest.
0.25	17.5	STOP; T-intersection with Route 100. TURN LEFT (northerly).
0.15-	17.65-	TURN LEFT (northwest) at entrance to Calhoun High School.
		LUNCH STOP. DISCUSSION OF MISSISSIPPI/ILLINOIS RIVER CHANGES DURING THE PLEISTOCENE EPOCH. (Near Center SE¼ NW¼ NW¼, Sec. 23, T. 10 S., R. 2 W., 4th P.M.; Hardin 7.5-minute quadrangle).
0.0	17.65	Leave Stop 6. STOP. TURN RIGHT (southerly) on State Route 100.
0.35+	18.0	Ahead and slightly to the right is a prominent bluff. The Burlington Limestone is the uppermost bedrock strata in this bluff.
0.35	18.35	CAUTION; congested area ahead in the north part of Hardin.
0.35	18.7	CAUTION; T-road from left from Page bridge. CONTINUE AHEAD (south) into Hardin.
0.25	18.95	STOP: (4-way). TURN RIGHT (west).
0.1-	19.05	STOP: (4-way). CONTINUE AHEAD (west).
0.3+	19.35	BEAR LEFT around curve.
0.1	19.45	To the right, note the large excavation in the slope; the bottom has slumped on the left side. The west end of the exposure shows the greenish-gray drab Hannibal Shale.
0.2	19.65	To the left across the creek, note a stand of Equisetum (horsetail).
0.1	19.75	Jog left and then right across the culvert.
0.2	19.95	Ascend steep hill and leave Hardin.
0.2	20.15	To the right is an abandoned roadside quarry in the Burlington Limestone. Note the very cherty nature of part of the exposure. Some zones in this exposure are quite fossiliferous. CONTINUE AHEAD (up the hill).

Miles to next point	Miles to Starting point	
0.55	20.7	Y-intersection; TURN LEFT onto gravel road.
0.25	20.95	STOP 7. VIEW FROM THE RIDGE TO THE EAST OF JERSEY COUNTY AND THE ILLINOIS VALLEY, AND TO THE WEST, ACROSS THE PRESENT MISSISSIPPI VALLEY INTO MISSOURI.
0.0	20.95	Leave Stop 7. CONTINUE AHEAD (south).
0.25-	21.2	To the right in the farmlot is a circular depression that might be a sinkhole.
0.35	21.55	Y-intersection. Bear right around curve and head west.
0.25	21.8	To the left is an excellent view down the Mississippi Valley.
0.4	22.2	CAUTION; descend steep Plummer Hill; shift to lower range.
0.05	22.25	To the left, notice the amount of slump that has taken place along the roadcut.
0.55	22.8	CAUTION; steep hill. Notice the view of the valley before you descend the hill.
0.5	23.3	STOP (1-way). TURN LEFT (south) and cross creek. This is the community of Gilead, the first county seat of Calhoun County (1821-1847).
0.6	23.9	To the left, note the terrace remnants about ¼ mile east.
0.05	23.95	T-road from left, Salt Spring Hollow; CONTINUE AHEAD (south) and cross narrow bridge.
2.25	26.2	This roadcut is through a steep-sided alluvial fan.
0.05	26.25	T-road from the left just before the creek crossing. On the north side of the T-road is a loess exposure that shows slumping. Because the base of the exposure did not have adequate drainage, the loess slumped and formed several terracettes (small, step-like scarps) down the exposure. CONTINUE AHEAD (south).
1.05-	27.3-	CAUTION; narrow culvert obscured by undergrowth.

Miles to next point	Miles to starting point	
0.85	28.15-	T-road from left. TURN LEFT (easterly) just before the narrow bridge. This is the mouth of Turner Hollow.
0.05+	28.2	To the left, notice the gullies.
0.45	28.65	Cross narrow bridge; BEAR LEFT (northeasterly) at Y-intersection. To the right, the upland level is a terrace level visible on both sides of the road about 15 to 20 feet above us.
0.35	29.25	CAUTION; ascend the upland to the terrace level. The road becomes quite steep.
0.1	29.35	Here the terrace level is not quite as flat on top as it is farther down the valley.
0.5	29.4	Start to ascend the steeper part of the hill.
1.0	30.4	This is the dividing ridge between the Illinois and Mississippi Rivers. Here the ridge is more narrow and sinuous than it is farther north in the field trip area.
0.7	31.1	Y-intersection. BEAR RIGHT (easterly).
0.85	31.95	CAUTION; descending steep Franklin Hill. Notice the view of Jersey County and the Illinois River valley ahead.
0.1	32.05	To the left are ledges of Burlington Limestone and thick masses of chert.

STOP 8. KEOKUK/BURLINGTON AND CHOUTEAU LIMESTONES ARE EXPOSED ALONG THE ROADCUT IN FRANKLIN HILL. (Near center SE¼, Sec. 22, T. 11 S., R. 2 W., 4th P.M.; Nutwood 7.5-minute Quadrangle).

The upper part of this exposure has the typical coarse crinoidal debris of the Keokuk Limestone. The lower part also contains scattered calcite-filled vugs up to two inches or so in diameter. A number of solution cavities are at the contact of the Burlington and the underlying Chouteau Limestones.

This is the last stop. Have a safe journey home and join us on future geological science field trips.

To leave this area, continue ahead to a T-road intersection with the blacktop, 0.3+ miles ahead. Turn left toward Hardin, about 5 miles north.

MISSISSIPPIAN DEPOSITION

(The following quotation is from Report of Investigations 216: Classification of Genevievian and Chesterian...Rocks of Illinois (1965) by D. H. Swann, pp. 11-16. One figure and short sections of the text are omitted.)

During the Mississippian Period, the Illinois Basin was a slowly subsiding region with a vague north-south structural axis. It was flanked by structurally neutral regions to the east and west, corresponding to the present Cincinnati and Ozark Arches. These neighboring elements contributed insignificant amounts of sediment to the basin. Instead, the basin was filled by locally precipitated carbonate and by mud and sand eroded from highland areas far to the northeast in the eastern part of the Canadian Shield and perhaps the northeastward extension of the Appalachians. This sediment was brought to the Illinois region by a major river system, which it will be convenient to call the Michigan River (fig. 4) because it crossed the present state of Michigan from north to south or northeast to southwest....

The Michigan River delivered much sediment to the Illinois region during early Mississippian time. However, an advance of the sea midway in the Mississippian Period prevented sand and mud from reaching the area during deposition of the St. Louis Limestone. Genevievian time began with the lowering of sea level and the alternating deposition of shallow-water carbonate and clastic units in a pattern that persisted throughout the rest of the Mississippian. About a fourth of the fill of the basin during the late Mississippian was carbonate, another fourth was sand, and the remainder was mud carried down by the Michigan River.

Thickness, facies, and crossbedding...indicate the existence of a regional slope to the southwest, perpendicular to the prevailing north 65° west trend of the shorelines. The Illinois Basin, although developing structurally during this time, was not an embayment of the interior sea. Indeed, the mouth of the Michigan River generally extended out into the sea as a bird-foot delta, and the shoreline across the basin area may have been convex more often than concave.

....The shoreline was not static. Its position oscillated through a range of perhaps 600 to 1000 or more miles. At times it was so far south that land conditions existed throughout the present area of the Illinois Basin. At other times it was so far north that there is no suggestion of near-shore environment in the sediments still preserved. This migration of the shoreline and of the accompanying sedimentation belts determined the composition and position of Genevievian and Chesterian rock bodies.

Lateral shifts in the course of the Michigan River also influenced the placement of the rock bodies. At times the river brought its load of sediment to the eastern edge of the basin, at times to the center, and at times to the western edge. This lateral shifting occurred within a range of about 200 miles. The Cincinnati and Ozark areas did not themselves provide sediments, but, rather, the Michigan River tended to avoid those relatively positive areas in favor of the down-warped basin axis

Sedimentation belts during this time were not symmetrical with respect to the mouth of the Michigan River. They were distorted by the position of the river relative to the Ozark and Cincinnati shoal areas, but of greater importance was sea current or drift to the northwest. This carried off most of the mud contributed by the river, narrowing the shale belt east of the river mouth and broadening it west of the mouth. Facies and isopach maps of individual units show several times as much shale west of the locus of sand deposition as east of it. The facies maps of the entire Chesterian...show maximum sandstone deposition in a northeast-southwest

belt that bisects the basin. The total thickness of limestone is greatest along the southern border of the basin and is relatively constant along that entire border. The proportion of limestone, however, is much higher at the eastern end than along the rest of the southern border, because little mud was carried southeastward against the prevailing sea current. Instead, the mud was carried to the northwest and the highest proportion of shale is found in the northwestern part of the basin.

Genevievian and Chesterian seas generally extended from the Illinois Basin eastward across the Cincinnati Shoal area and the Appalachian Basin. Little terrigenous sediment reached the Cincinnati Shoal area from either the west or the east, and the section consists of thin limestone units representing all or most of the major cycles. The proportion of inorganically precipitated limestone is relatively high and the waters over the shoal area were commonly hypersaline... Erosion of the shoal area at times is indicated by the presence of conodonts eroded from the St. Louis Limestone and redeposited in the lower part of the Gasper Limestone at the southeast corner of the Illinois Basin...

The shoal area included regions somewhat east of the present Cincinnati axis and extended from Ohio, and probably southeastern Indiana, through central and east-central Kentucky and Tennessee into Alabama....

Toward the west, the seaway was commonly continuous between the Illinois Basin and central Iowa, although only the record of Genevievian and earliest Chesterian is still preserved. The seas generally extended from the Illinois and Black Warrior regions into the Arkansas Valley region, and the presence of Chesterian outliers high in the Ozarks indicates that at times the Ozark area was covered. Althoug the sea was continuous into the Ouachita region, detailed correlation of the Illinois sediments with the geosynclinal deposits of this area is difficult.

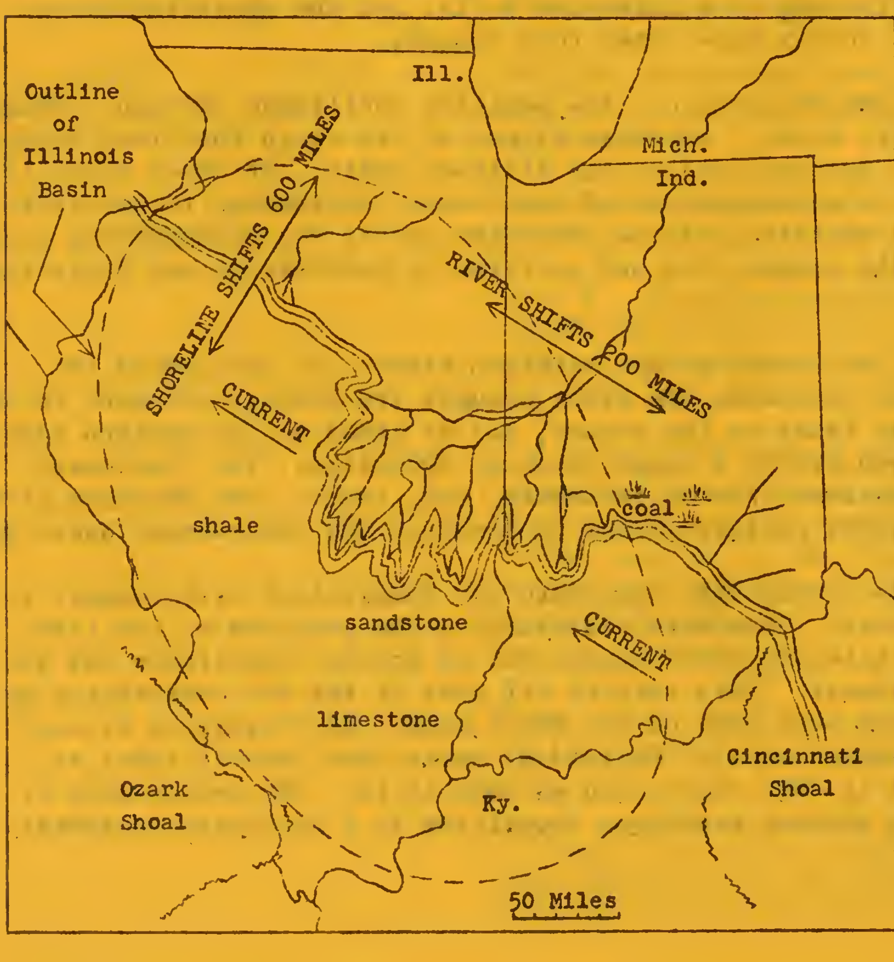
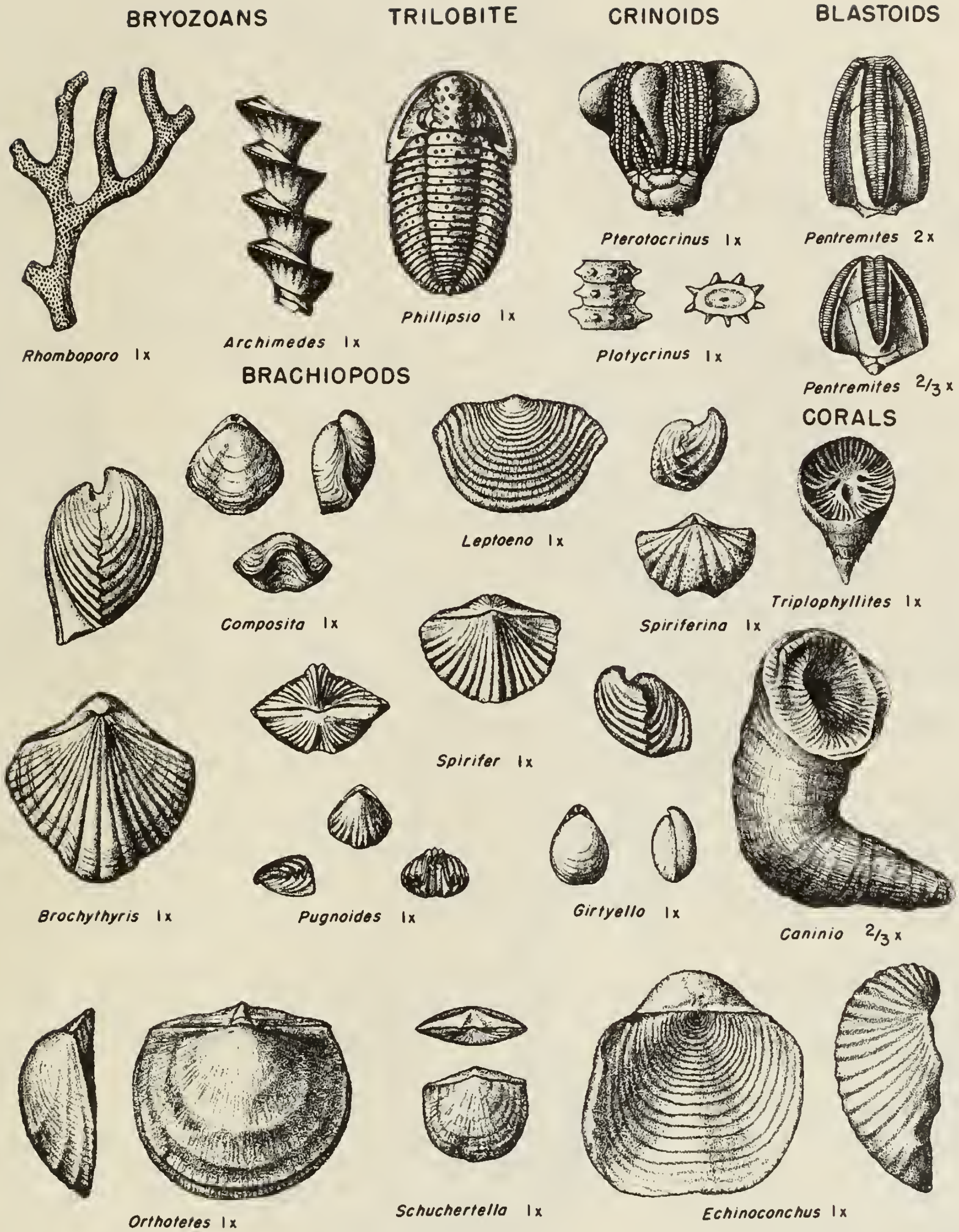
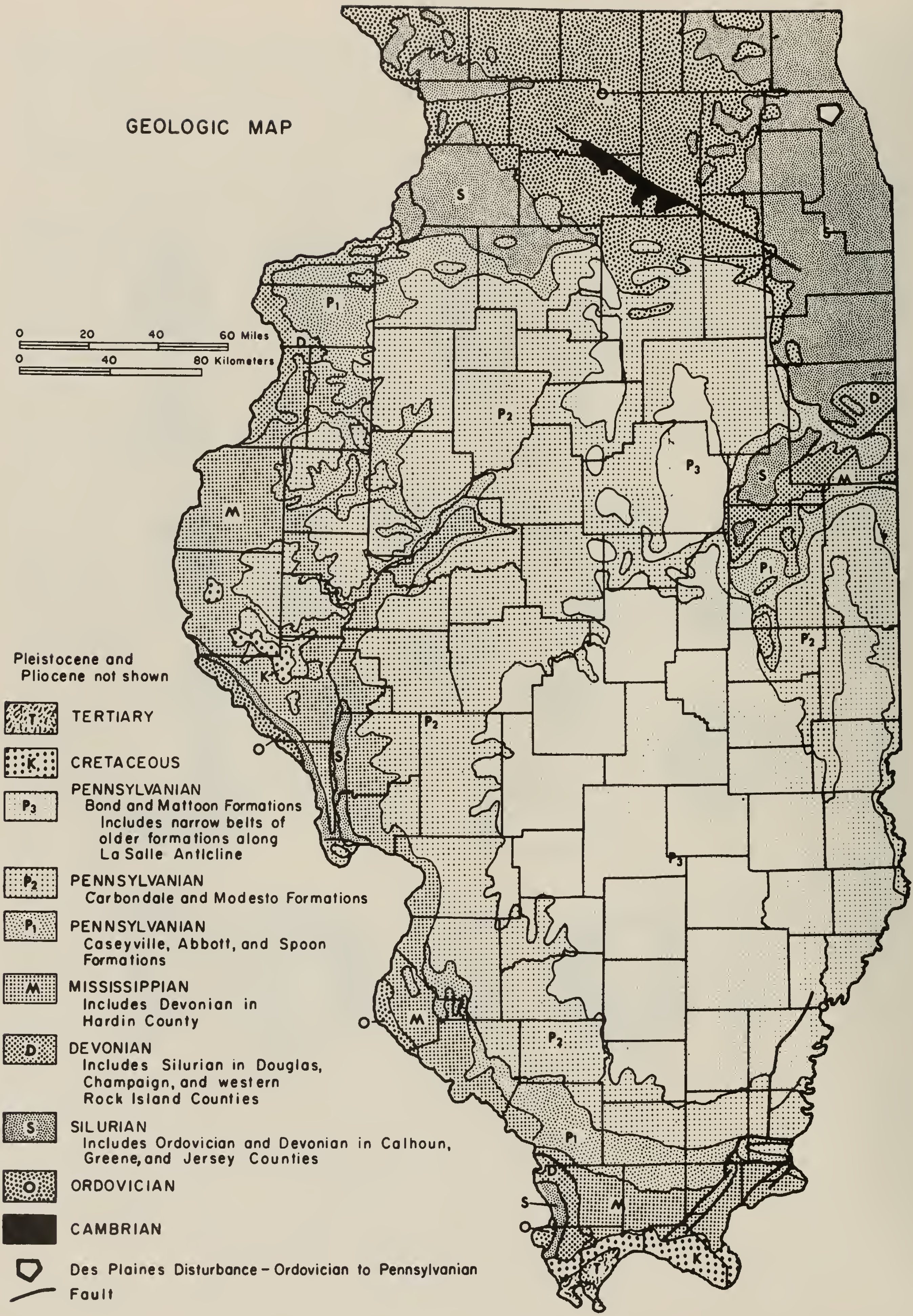


Fig. 4 - Paleogeography at an intermediate stage during Chesterian sedimentation.


BRYOZOANS
TRILOBITE
CRINOIDS
BLASTOIDS
Rhombopora 1x
Archimedes 1x
Phillipsia 1x
Pterotocrinus 1x
Platycrinus 1x
Pentremites 2x
Pentremites 2/3x
BRACHIOPODS
CORALS
Composita 1x
Leptaena 1x
Spiriferina 1x
Triplophyllites 1x
Spirifer 1x
Brachythyris 1x
Pugnoides 1x
Girtyella 1x
Caninia 2/3x
Orthotetes 1x
Schuchertella 1x
Echinoconchus 1x



GEOLOGIC MAP
0 20 40 60 Miles
0 40 80 Kilometers
Pleistocene and Pliocene not shown
TERTIARY
CRETACEOUS
PENNSYLVANIAN
Bond and Mattoon Formations
Includes narrow belts of older formations along La Salle Anticline
PENNSYLVANIAN
Carbondale and Modesto Formations
PENNSYLVANIAN
Caseyville, Abbott, and Spoon Formations
MISSISSIPPIAN
Includes Devonian in Hardin County
DEVONIAN
Includes Silurian in Douglas, Champaign, and western Rock Island Counties
SILURIAN
Includes Ordovician and Devonian in Calhoun, Greene, and Jersey Counties
ORDOVICIAN
CAMBRIAN
Des Plaines Disturbance – Ordovician to Pennsylvanian
Fault

GEOGRAM 5
October 1975

ANCIENT DUST STORMS IN ILLINOIS

Myrna M. Killey

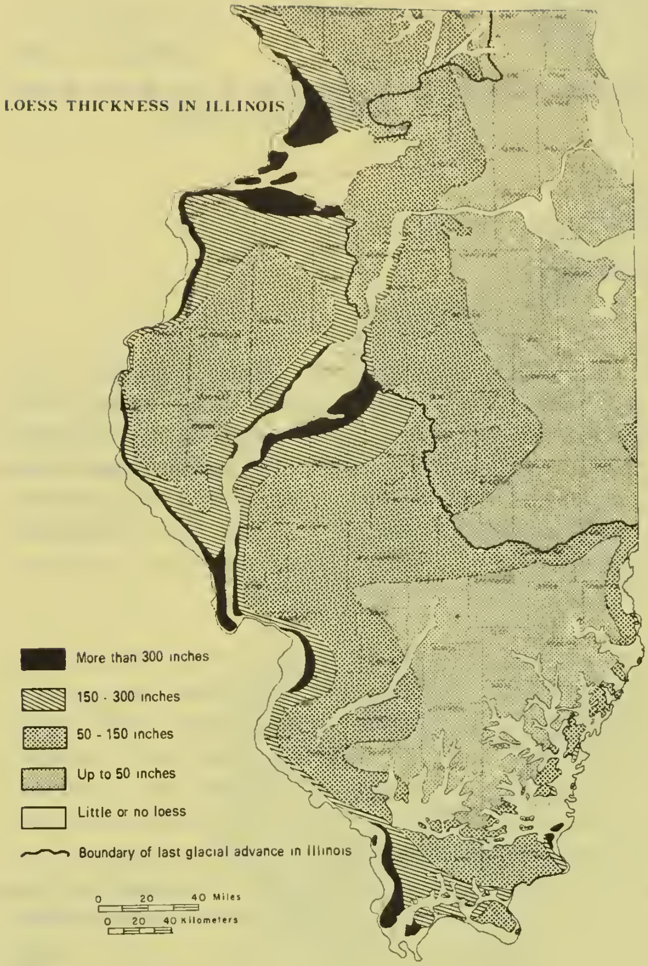
Fierce dust storms whirled across Illinois long before human beings were here to record them. Where did all the dust come from? Geologists have carefully put together clues from the earth itself to get the story. As the glaciers of the Great Ice Age scraped and scoured their way southward across the landscape from Canada, they moved colossal amounts of rock and earth. Much of the rock ground from the surface was kneaded into the ice and carried along, often for hundreds of miles. The glaciers acted as giant grist mills, grinding much of the rock and earth to "flour"—very fine dust-sized particles.

During the warm seasons, water from the melting ice poured from the glacier front, laden with this rock flour, called silt. In the cold months the meltwater stopped flowing and the silt was left along the channels the water had followed, where it dried out and became dust. Strong winds picked up the dust, swept it from the floodplains, and carried it to adjacent uplands. There the forests along the river valleys trapped the dust, which became part of the moist forest soil. With each storm more material accumulated until the high bluffs adjacent to major rivers were formed. The dust deposits are thicker along the eastern sides of the valleys than they are on the western sides, a fact from which geologists deduce that the prevailing winds of that time blew from west to east, the same direction as those of today. From such clues geologists conclude that the geologic processes of the past were much like those of today.

The deposits of windblown silt are called loess (rhymes with "bus"). Loess is found not only in the areas once covered by the glaciers but has been blown into the nonglaciated areas. The glaciers, therefore, influenced the present land surface well beyond the line of their farthest advance.

Loess has several interesting characteristics. Its texture is so fine and uniform that it can easily be identified in roadcuts—and because it blankets such a vast area many roads are cut through it. Even more noticeable is its tendency to stand in vertical walls. These steep walls develop as the loess drains and becomes tough, compact, and massive, much like a rock. Sometimes cracks develop in the loess, just as they do in massive limestones and sandstones. Loess makes good highway banks if it is cut vertically. A vertical cut permits maximum drainage because little surface is exposed to rain, and rainwater tends to drain straight down through it to the rock underneath. If the bank is cut at an angle more water soaks in, which causes the loess to slump down. Along Illinois roads the difference between a loess roadcut and one in ordinary glacial till is obvious. The loess has a very uniform texture, while the till is composed of a random mixture of rock debris, from clay and silt through cobbles and boulders.

Many loess deposits are worth a close look. Through a 10-power hand lens separate grains can be seen, among them many clear, glassy, quartz grains. Some loess deposits contain numerous rounded, lumpy stones called concretions. Their formation began when water percolating through the loess dissolved tiny



limestone grains. Some of the dissolved minerals later became solid again, gathering around a tiny nucleus or along roots to form the lumpy masses. A few such concretions are shaped roughly like small dolls and, from this resemblance, are called "loess kindchen," a German term meaning "loess children." They may be partly hollow and contain smaller lumps that make them rattle when shaken.

Fossil snails can be found in some loess deposits. The snails lived on the river bluffs while the loess was being deposited and were buried by the dust. When they are abundant, they are used to determine how old the loess is. The age is found by measuring the amount of radioactive carbon in the calcium carbonate of their shells.

Some of the early loess deposits were covered by new layers of loess following later glacial invasions. Many thousands of years passed between the major glacial periods, during which time the climate was as warm as that of today. During the warm intervals, the surface of the loess and other glacial deposits was exposed to weather. Soils developed on most of the terrain, altering the composition, color, and texture of the glacial material. During later advances of the ice, some of these soils were destroyed, but in many places they are preserved under the younger sediments. Such ancient buried soils can be used to determine when the materials above and below them were laid down by the ice and what changes in climate took place.

The blanket of loess deposited by the ancient dust storms forms the parent material of the rich, deep soils that today are basic to the state's agriculture. A soil made of loess crumbles easily and has great moisture-holding capacity. It also is free from rocks that might complicate cultivation. Those great dust storms that swirled over the land many thousands of years ago thus endowed Illinois with one of its greatest resources, its highly productive soil.

PHYSIOGRAPHIC DIVISIONS OF ILLINOIS

Reprinted 1978

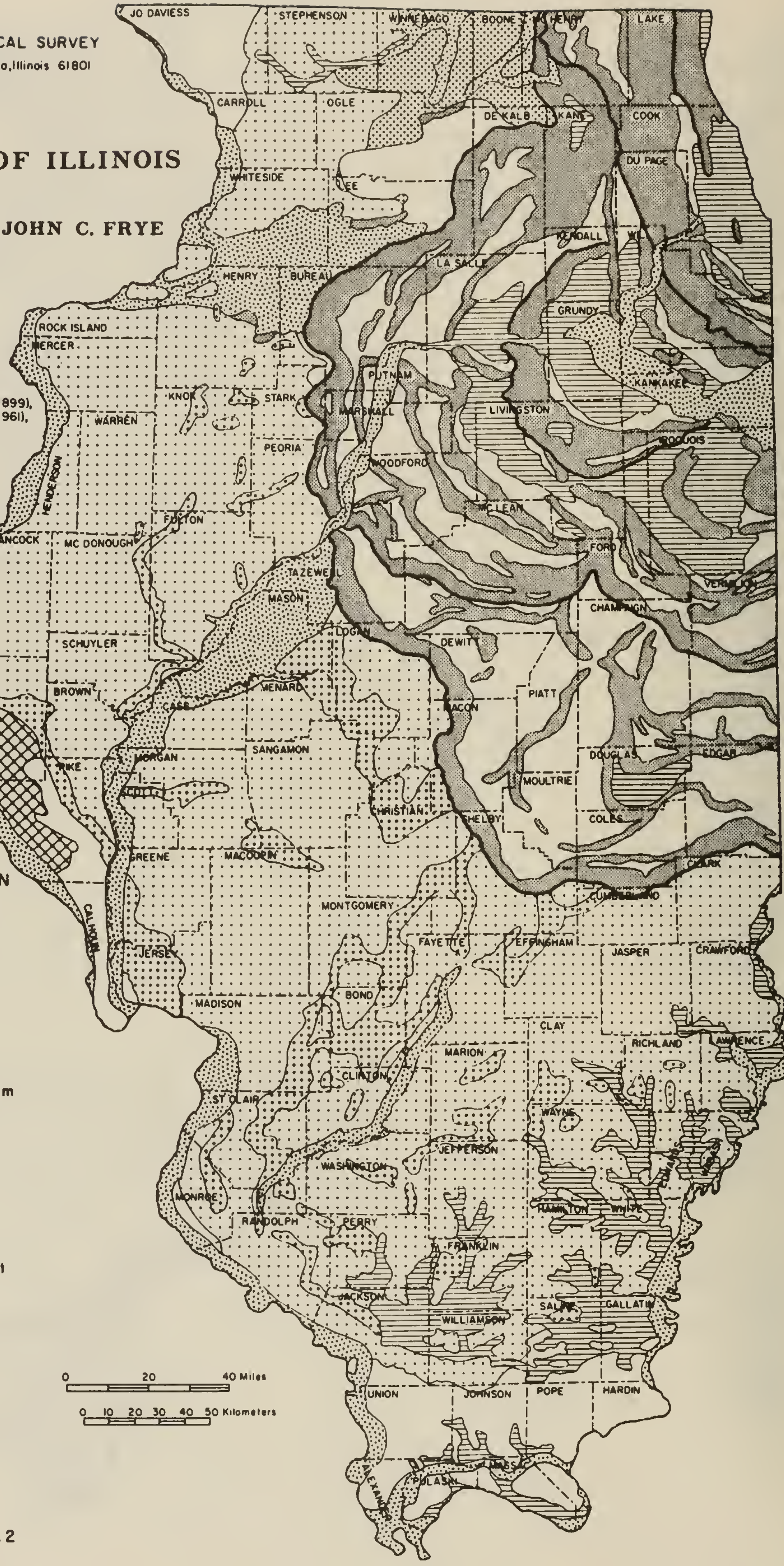
ILLINOIS STATE GEOLOGICAL SURVEY
John C. Frye, Chief   Urbana, Illinois 61801

GLACIAL MAP OF ILLINOIS

H.B. WILLMAN and JOHN C. FRYE

1970

Modified from maps by Leverett (1899), Ekblaw (1959), Leighton and Brophy (1961), Willman et al. (1967), and others



EXPLANATION

HOLOCENE AND WISCONSINAN

Alluvium, sand dunes, and gravel terraces

WISCONSINAN

Lake deposits

WOODFORDIAN

Moraine

Front of morainic system

Groundmoraine

ALTONIAN

Till plain

ILLINOIAN

Moraine and ridged drift

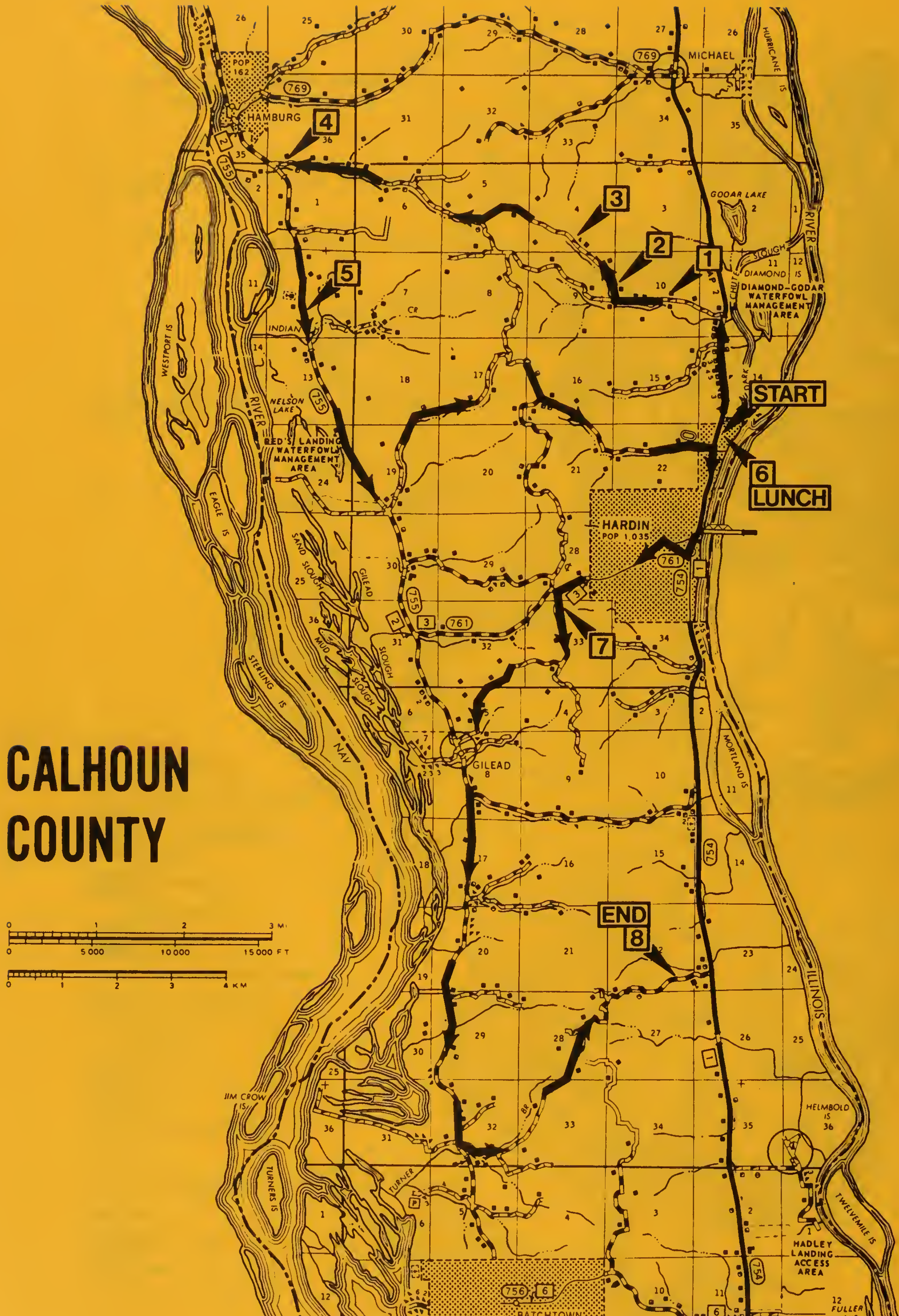
Groundmoraine

KANSAN

Till plain

DRIFTLESS

Modified from Bull. 94.—pl. 2


CALHOUN
COUNTY
START
1
2
3
4
5
6
LUNCH
7
END
8
HAMBURG
POP 162
MICHAEL
HARDIN
POP 1,035
GILEAD
BATCHTOWN
GOOAR LAKE
DIAMOND-GODAR
WATERFOWL
MANAGEMENT
AREA
DIAMOND IS
CHUTE
SLOUGH
HURRICANE IS
RIVER
ILLINOIS
MORTLAND IS
HELMBOLD IS
TWELVEMILE IS
HADLEY
LANDING
ACCESS
AREA
FULLER LAKE
WESTPORT IS
EAGLE IS
STERLING IS
NAV
RED'S LANDING
WATERFOWL
MANAGEMENT
AREA
NELSON LAKE
INDIAN
CR
SAND SLOUGH
GILEAD SLOUGH
MUD SLOUGH
JIM CROW IS
TURNERS IS
TURNER
769
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761
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